

- Oxidation at temperatures of 660° , 750° , 850° and 940°C with 2 passes of the burner at each temperature maintaining a constant He/O_2 ratio of 1:5 .
- The dehydration was carried out at a temperature of 930°C with a $\text{Cl}_2: \text{O}_2$ ratio of 2.25 : 1 for a period of one hour.
- For sintering the temperature was increased in 3 steps up to 1220°C , each step consisting of 2 passes of the burner. GeCl_4 was added in controlled quantities during this stage with the input oxygen with two passes at 1220°C and one pass at 1425°C in order to adjust the NA of the preform / fibre.
- The tube was further heated to increase the temperature stepwise to 1650°C for complete sintering of the Ge, Er & Al containing coated layer. During sintering O_2 and He flow was in the ratio of 5:1.
- The collapsing was done in 3 steps in the usual manner with positive oxygen pressure of 4 psi inside the tube to avoid any deformation in shape or geometry and excessive evaporation of GeO_2 or other oxides from the core.
- Overcladding was done to reduce the core:clad ratio to 3.4:125. The NA measured in the fibre was 0.21 ± 0.01 .
- The Er^{3+} ion concentration in the fibre was 220 ppm approx. as measured from the absorption at selected wavelengths.

EXAMPLE 2

Nd-doped fibre

- Amorphous silica microspheres synthesized by hydrolysis of tetraethoxyorthosilicate (Stober method) were dispersed in a solution of Neodimium nitrate (kept in an ice bath) in a proportion of 98.5 mol% SiO_2 and 1.5 mol% Nd_2O_3 under sonication followed by the addition of aqueous ammonia by known process. The resulting product was washed with water followed by centrifugation and drying under vacuum.
- A stable dispersion of composition $94.8\text{SiO}_2 : 3\text{GeO}_2 : 2\text{Al}_2\text{O}_3 : 0.20\text{ Nd}_2\text{O}_3$ (in equivalent oxide mol%) was prepared for the application of coating to the inner wall of high purity clear fused silica glass tubes.

- From the Neodium oxide (Nd_2O_3) coated silica powders with 98.5 mol% SiO_2 and 1.5 mol% Nd_2O_3 , a silica sol of composition of 94.8 equivalent mol% of SiO_2 and 0.20 equivalent mol% of Nd_2O_3 was prepared by diluting with a silica sol containing the desired amount of silicon tetraethoxide (TEOS).
- Silica-germania sol containing 3 equivalent oxide mol% of germanium ethoxide $[\text{Ge}(\text{OC}_2\text{H}_5)_4]$ was prepared through the hydrolysis of TEOS and $[\text{Ge}(\text{OC}_2\text{H}_5)_4]$ with water and hydrochloric acid in presence of a mixed solvent of propan-1-ol and butan-2-ol. pH of the above sol was 1.2 ± 0.05 .
- 2 equivalent oxide mol% of $[\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}]$ and 0.20 equivalent mol% of Nd_2O_3 through Nd_2O_3 coated SiO_2 powders (after baking at 100°C for 5h) were dispersed in the above silica sol under sonication (26 kHz) for 80 mins.
- The resultant dispersion after allowing to settle for 2 h, was used to coat the inner wall of the thoroughly cleaned silica glass tubes with inner diameter of 17.9 mm. The outer wall of the tubes were properly masked with a suitable substance (parafilm).
- Coating was performed by dipping the silica glass tubes with a speed of 6 cm/min into the dispersion and lifting the same tube from the above dispersions with the same speed.
- The coated tubes were dried in air at 80°C for 1.5 h.
- Oxidation at temperatures of 700° , 820° and 910°C with 2 passes of the burner at each temperature maintaining a constant He/O_2 ratio of 1:6.
- The dehydration was carried out at a temperature of 900°C with a $\text{Cl}_2 : \text{O}_2$ ratio of 2.5 : 1 for a period of 1.25 hour.
- For sintering the temperature was increased in 4 steps up to 1225°C , each step consisting of 2 passes of the burner. GeCl_4 was added in controlled quantities during this stage with the input oxygen with two passes at 1225°C and one pass at 1400°C in order to adjust the NA of the preform / fibre.
- The tube was further heated to increase the temperature stepwise to 1600°C for complete sintering of the Ge, Nd & Al containing coated layer. During sintering O_2 and He flow was in the ratio of 4:1.

- The collapsing was done in 3 steps in the usual manner with positive oxygen pressure of 4 psi inside the tube to avoid any deformation in shape or geometry and excessive evaporation of GeO_2 or other oxides from the core.
- Overcladding was done to reduce the core:clad ratio to 3.5:125. The NA measured in the fibre was 0.22 ± 0.01 .
- The Nd^{3+} ion concentration in the fibre was 2350 ppm approx. as measured from the absorption at selected wavelengths.

EXAMPLE 3

Eu-doped fibre

- Amorphous silica microspheres synthesized by hydrolysis of tetraethoxyorthosilicate (Stober method) were dispersed in a solution of europium nitrate (kept in an ice bath) in a proportion of 99.0 mol% SiO_2 and 1.0 mol% Eu_2O_3 under sonication followed by the addition of aqueous ammonia by known process. The resulting product was washed with water followed by centrifugation and drying under vacuum.
- A stable dispersion of composition 95.99 SiO_2 : 3 GeO_2 : 1 Al_2O_3 : 0.01 Eu_2O_3 (in equivalent oxide mol%) was prepared for the application of coating to the inner wall of high purity clear fused silica glass tubes.
- From the europium oxide (Eu_2O_3) coated silica powders with 99.0 mol% SiO_2 and 1.0 mol% Eu_2O_3 , a silica sol of composition of 95.99 equivalent mol% of SiO_2 and 0.01 equivalent mol% of Eu_2O_3 was prepared by diluting with a silica sol containing the desired amount of silicon tetraethoxide (TEOS).
- Silica-germania sol containing 3 equivalent oxide mol% of germanium ethoxide $[\text{Ge}(\text{OC}_2\text{H}_5)_4]$ was prepared through the hydrolysis of TEOS and $[\text{Ge}(\text{OC}_2\text{H}_5)_4]$ with water and hydrochloric acid in presence of a mixed solvent of propan-1-ol and butan-2-ol. pH of the above sol was 1.0 ± 0.05 .
- 1 equivalent oxide mol% of $[\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}]$ and 0.01 equivalent mol% of Eu_2O_3 through Eu_2O_3 coated SiO_2 powders (after baking at 100°C for 1h) were dispersed in the above silica sol under sonication (26 kHz) for 80 mins.